

Trends in Doctorate Recipients

Overall Numbers and Rates of Growth. U.S. universities awarded 42,705 research doctorate degrees² during the 1996-1997 academic year (July 1, 1996, through June 30, 1997). This is the highest one-year total ever, 32 percent higher than the corresponding figure of a decade ago, and 10 percent higher than the total for 1992, five years ago. For the longer time period of 1957—the year of Sputnik—to 1997, the annual rate of increase in earned doctorates has been 4.1 percent: first a steep growth from 1957 to 1973, a “saddle” until the late 1980s, and then a steady upward trend for the last 10 years. However, 1990 was the only year since 1972 in which the growth rate exceeded the long-term average. Figures 1 and 2 and Tables 1 and 2 provide complementary visual depictions and the raw data for these observed trends. The extent to which field of study, sex, citizenship, and race/ethnicity contributed to the overall growth trends are discussed in appropriate sections below.

The annual growth rate from 1996 to 1997, 0.7 percent, was less than the growth rate for the preceding 12-month period (1.6%), and the lowest for any year since 1985. However, this also marks the twelfth consecutive year of increase in the number of doctorates earned, something not seen since the double-digit annual growth period of the 1960s and early 1970s. (It was not until 1989 that the total annual doctorates awarded again reached the 1973 peak of 33,755; this 16-year interval showed some years of modest annual increases, punctuated by several years with larger percentage declines.)

By way of comparison to other graduate/professional programs for the 1996-1997 academic year, 15,907 M.D. degrees were awarded, a number that has held steady in recent times despite a fall in the number of applications to medical school. In that same year, 40,140 J.D. degrees were awarded by U.S. law schools (virtually unchanged for the past several years). In 1995-1996, 93,982 MBA degrees were conferred by the nation's business schools (1996-1997 data are not yet available)³.

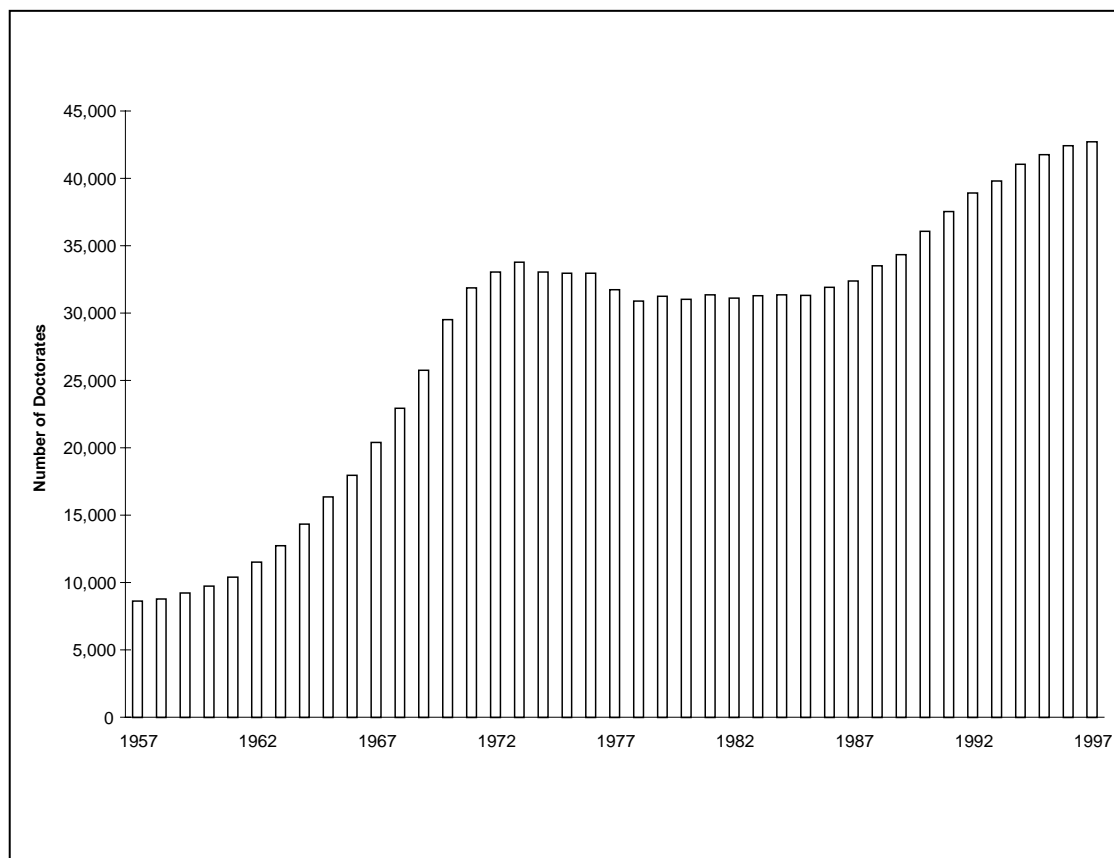
² Doctorates are reported by academic year (from July 1 of one year through June 30 of the following year) and include *research* and *applied-research doctorates* in all fields. Doctoral degrees such as the Ph.D., D.Sc., and Ed.D. are covered by this survey; professional degrees (e.g., M.D., D.D.S., J.D., Psy.D.) are not. A full list of included degrees can be found on the last page of the report. For convenience throughout this report, “Ph.D.” is used to represent any of the doctoral degrees covered by the survey.

³ Data furnished to NORC by the three respective professional associations.

Doctorate-Granting Institutions and Doctorates per Institution. The number of universities—382—that awarded doctorates in 1997 has remained approximately the same for the last few years and may have leveled off after increasing steadily since the early 1960s. The 1997 figure is more than double the 1961 number of 174, with the intervening period witnessing increases in the number of doctorate-granting institutions almost every year, as shown in Table 3. (There are 126 medical schools in the United States, 181 law schools, and more than 700 business programs that award MBA degrees.)

The average number of doctorates awarded per institution has increased slowly over the last decade, but it is still lower than the peak period of the early 1970s, when it had doubled in the space of just 12 years. The 1997 figure of 112 is the highest in the 1990s, but the annual number of degrees per institution has remained within a relatively narrow band for the last 30 years. (See Table 3.)

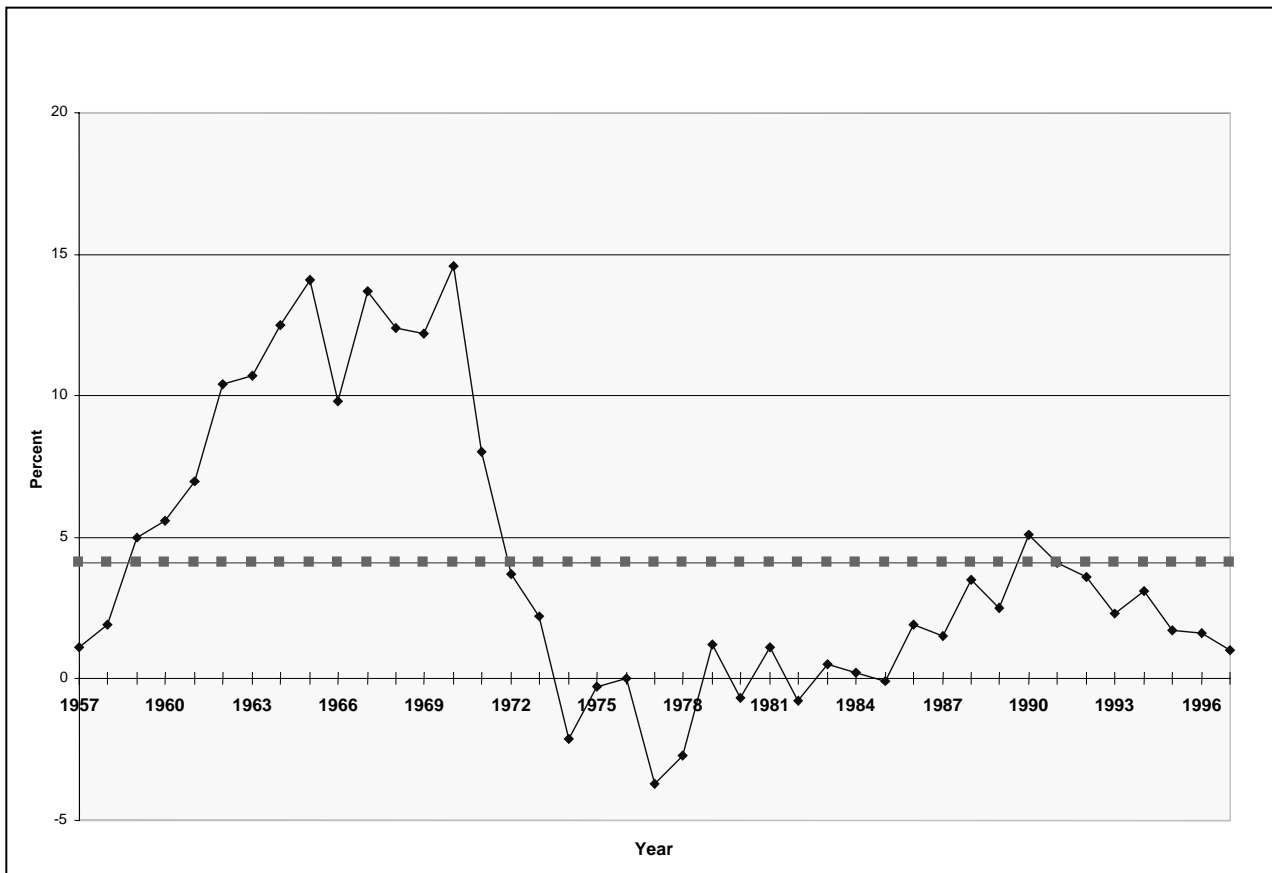
Figure 1
Doctorates awarded by U.S. colleges and universities, 1957-1997



See Table 1, Page 49.

SOURCE: NSF/NIH/NEH/USED/USDA, Survey of Earned Doctorates.

Figure 2
Annual growth or decline in doctorates awarded by
U.S. colleges and universities, 1957-1997



See Table 2, Page 49.

SOURCE: NSF/NIH/NEH/USED/USDA, Survey of Earned Doctorates.

However, there is considerable dispersion around that overall average and the inter-institutional variation in the aggregate, as well as in the distribution of degrees by broad field area. The variation may be more interesting than the measure of central tendency (in this case, the mean), which is not a particularly informative figure for institutional or public-policy decision making. For example, only 109 of the 382 institutions awarding doctorates in 1997 granted more than the average number, but they accounted for 76.8 percent (32,810) of all doctorates awarded in that year. These 109 institutions granted over 300 doctorates on average while the remaining 273 institutions granted an average of only 36 doctoral degrees.

More than anything else, this range simply points out the enormous heterogeneity across the rich landscape of higher education in the United States. About 2,000 colleges and universities award at least a baccalaureate degree, and about 400 grant some type of doctorate. The Carnegie

Classification of Higher Education, developed by Clark Kerr in 1970 and modified over time, groups American colleges and universities by their primary academic mission. Institutions are classified according to the highest degree conferred and, for institutions that offer the doctorate, the number of doctorates awarded, the academic disciplines represented, and the dollar volume of the institution's Federal support.

Currently 236 universities fall into the four principal Carnegie groups of research doctorate institutions, and more than 150 institutions fall into an "other" category representing comprehensive colleges and universities, and specialty schools of religion and theology, medicine and health, engineering, business, art and music, and so forth. Table 4 shows the number of universities granting doctorates in 1997 by Carnegie classification, the number and percent of all doctorates awarded within each grouping, and the average number of doctorates awarded by broad category. Figure 3 provides a visual summary of the same information.

As can be seen in Figure 3, Research I universities account for slightly less than a quarter of all doctorate-granting institutions, but collectively they award more than two-thirds of all doctorates; the Research I universities average 327 doctoral degrees per institution, whereas those in the other four institutional groups average only 47.

As noted above, the number of doctorate-granting institutions has substantially increased over the last 25 years. That growth has occurred in all Carnegie classifications categories, but mainly within Research I, Doctoral II, and Other (that is, comprehensive universities and specialized institutions); the number of doctorate-granting institutions categorized as Research II or Doctoral I has not grown over this period.

Doctorates by Broad Field. Of considerable national and institutional interest is the distribution of the 42,705 doctorates by academic field, and comparisons by field with prior years' distributions. Understanding the levels and trends in doctoral education by broad field of study (and by citizenship, race/ethnicity, and sex) is of paramount importance to faculty and academic administrators, Federal and private sponsors of doctoral education (and the SED), research and development interests, and others involved in policy decisions that affect graduate education and the nation's highly trained work force.

For 1997, as in previous single years, the overall 0.7 percentage gain in number of earned doctorates was not evenly distributed across academic fields. Figures 4 and 5 and Table 5 provide graphic depictions and data in five-year intervals from 1967 to 1997. Within science and engineering (S & E), the number of doctorates fell by 1 percent from 1996 to 1997, with three of

the four categories showing declines (the social sciences alone had a gain—1.5 percent).⁴ Between 1992 and 1997, the combined S & E area showed a gain of 9.8 percent, matching exactly the percentage increase for all doctoral fields in that time span. Among specific S & E fields, only chemistry and agricultural sciences registered losses over that five-year period.

Within the traditional arts and sciences fields, the humanities had the largest percentage increase in doctorates, 5.3 percent, between 1996 and 1997; the number of doctorates was also higher for the major disciplines within the humanities. Over the longer five-year period from 1992 to 1997, the rate of increase in doctorates for the humanities—21.2 percent—was more than double the average across all fields.

In groupings familiar to many graduate school deans (in part because of similarities with regard to sources and levels of financial aid, time to degree, and other demographic characteristics, as well as the traditional purviews of these academic administrators), there were 14,787 doctorates awarded in the physical and life sciences in 1997, and 12,304 in the humanities and social sciences, a decrease of 1.0 percent and an increase of 3.1 percent, respectively, over 1996. For the five-year period 1992-1997, both of these broad groupings showed gains in the number of doctorates, 8.6 percent and 15.4 percent, respectively.

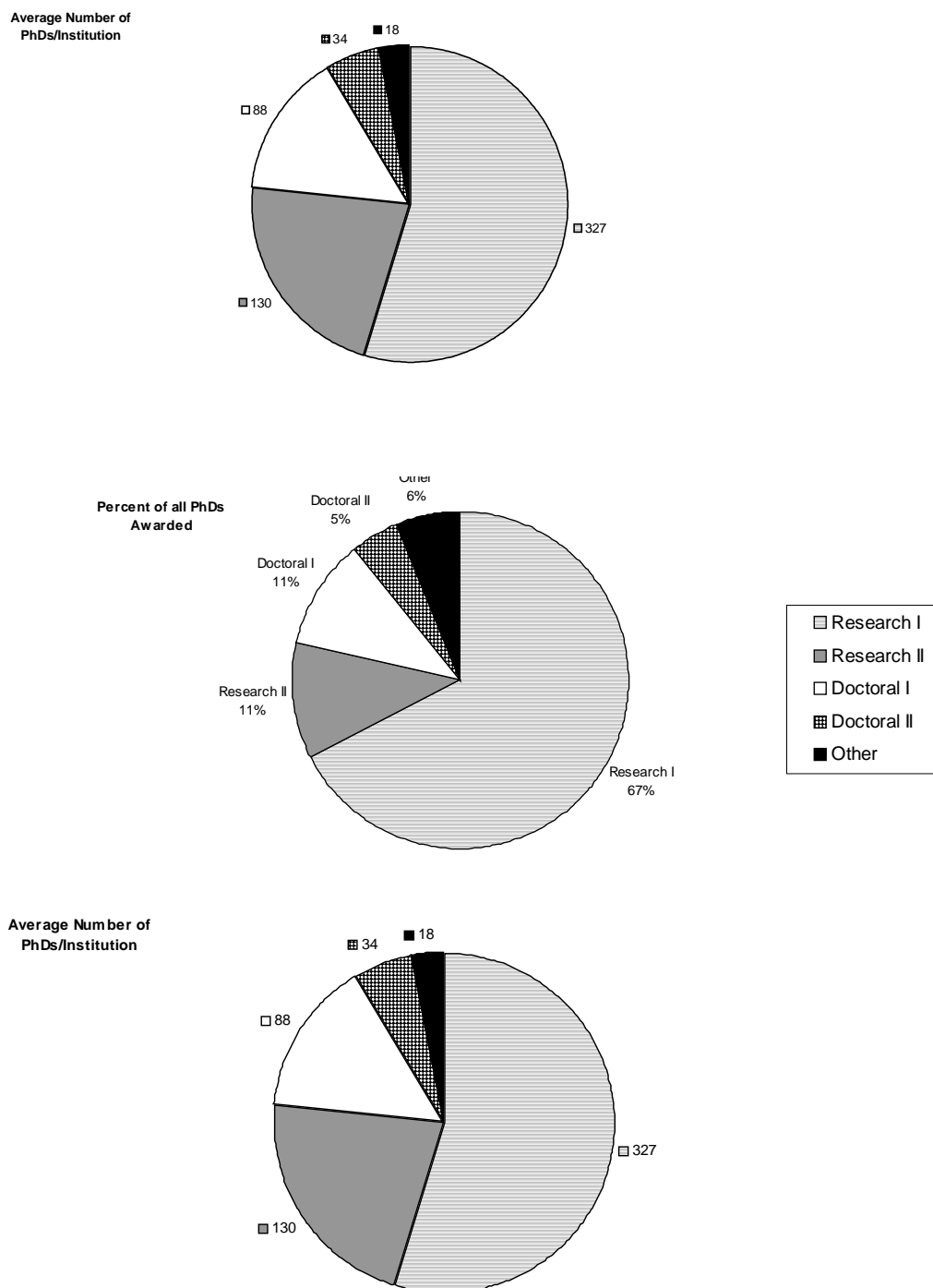
The 4 percent decline in engineering doctorates from 1996 to 1997 represents the first annual negative rate of change in that field since 1986, although the number of engineering doctorates—6,052—is the second largest total ever.

Education registered a 2.7 percent decline in Ph.D.s conferred from 1992 to 1997, but in the same five-year period, areas of doctoral study that fall into the professional and other grouping exhibited a 14.6 percent increase in degrees awarded.

When compared over a much longer period, the gains in all major fields are substantial (see Table 5). From 1967 to 1997, in the aggregate, the number of doctorates doubled. The largest broad category in 1967—the physical sciences, computer sciences, and mathematics—grew 51.7 percent by 1997, but is now only the third largest of the seven groupings. Within the physical sciences, 40 percent of the 30-year gain came from just one field—computer science, which awarded no doctorates until the 1970s.

⁴ Hill, Susan, T. “Doctorate Awards Declining in Some Science and Engineering Fields.” Data Brief, NSF 99-339, National Science Foundation, Division of Science Resources Studies. Arlington, VA. April 6, 1999.

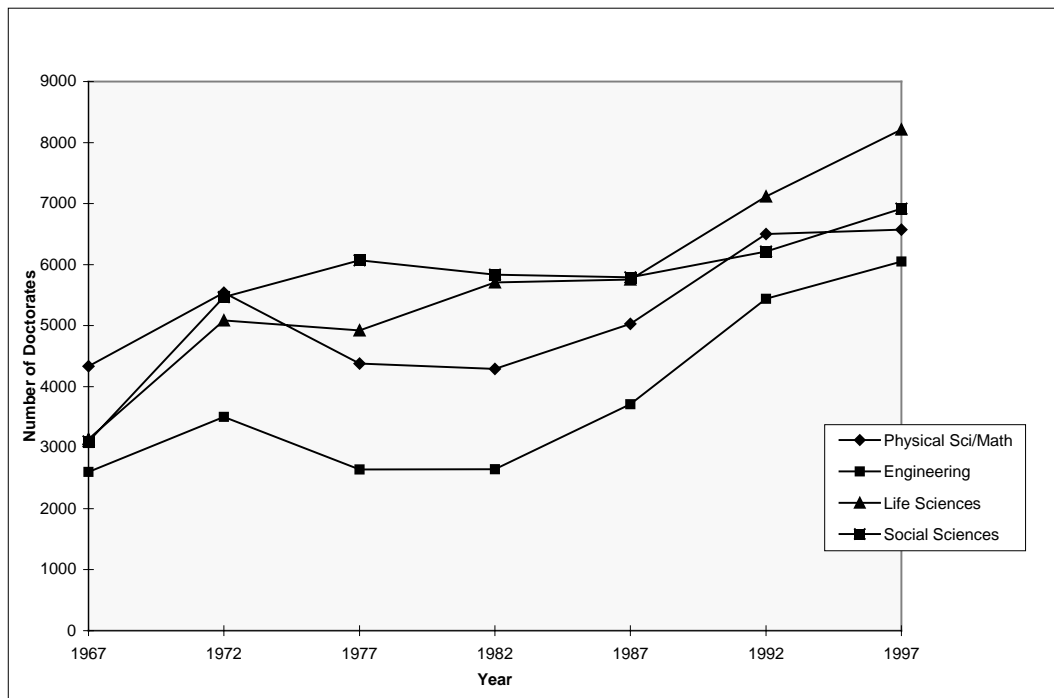
Figure 3
Distribution of Ph.D.-granting institutions and doctorates
by Carnegie classification, 1997



See Table 4, Page 50.

SOURCE: NSF/NIH/NEH/USED/USDA, Survey of Earned Doctorates.

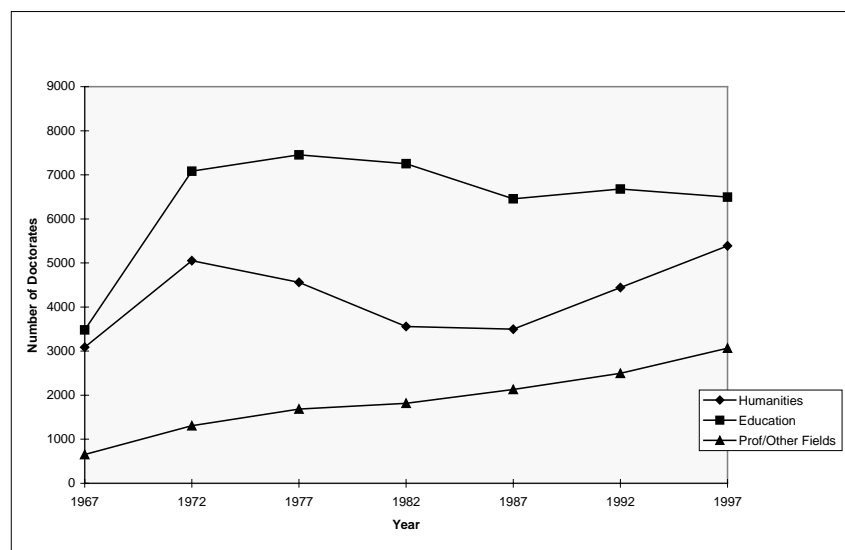
Figure 4
Science and engineering doctorates awarded by broad field, 1967-1997



See Table 5, Page 51.

SOURCE: NSF/NIH/NEH/USED/USDA, Survey of Earned Doctorates.

Figure 5
Education, humanities, and professional/other doctorates awarded by broad field, 1967-1997



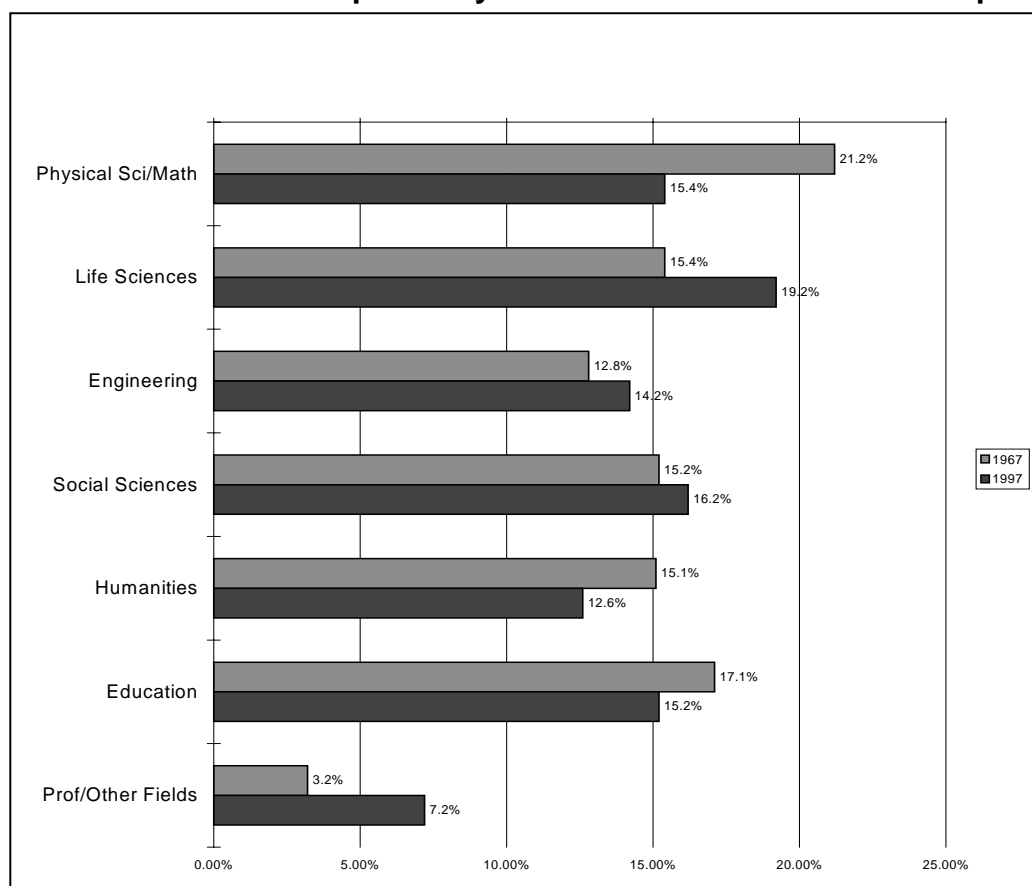
See Table 5, Page 51.

SOURCE: NSF/NIH/NEH/USED/USDA, Survey of Earned Doctorates.

The number of doctorates granted in engineering, life sciences, and the social sciences all more than doubled between 1967 and 1997, with the biological and health sciences showing the largest gain. In some social sciences, as well as in the humanities and education, much of the 30-year increase occurred between 1967 and 1972, and in fact, the absolute numbers have held steady or have actually decreased since then, as illustrated in Figures 4 and 5. Within the professional fields, the greatest gains have been in business/management.

The rates of increase (and, in some instances, decrease) within major fields of study have changed the relative size of these broad groupings over time. For example, in 1967, 21.2 percent of all doctorates were awarded in the physical sciences; for 1997 that share was 15.4 percent. Figure 6 shows the relative proportions of the seven broad categories. For the four S & E fields combined, however, the 1967 and 1997 shares are almost identical—64.6 percent in 1967 and 65.0 percent 30 years later.

Figure 6
Distribution of Ph.D. recipients by broad field: 1967 and 1997 compared



See Table 5, Page 51.

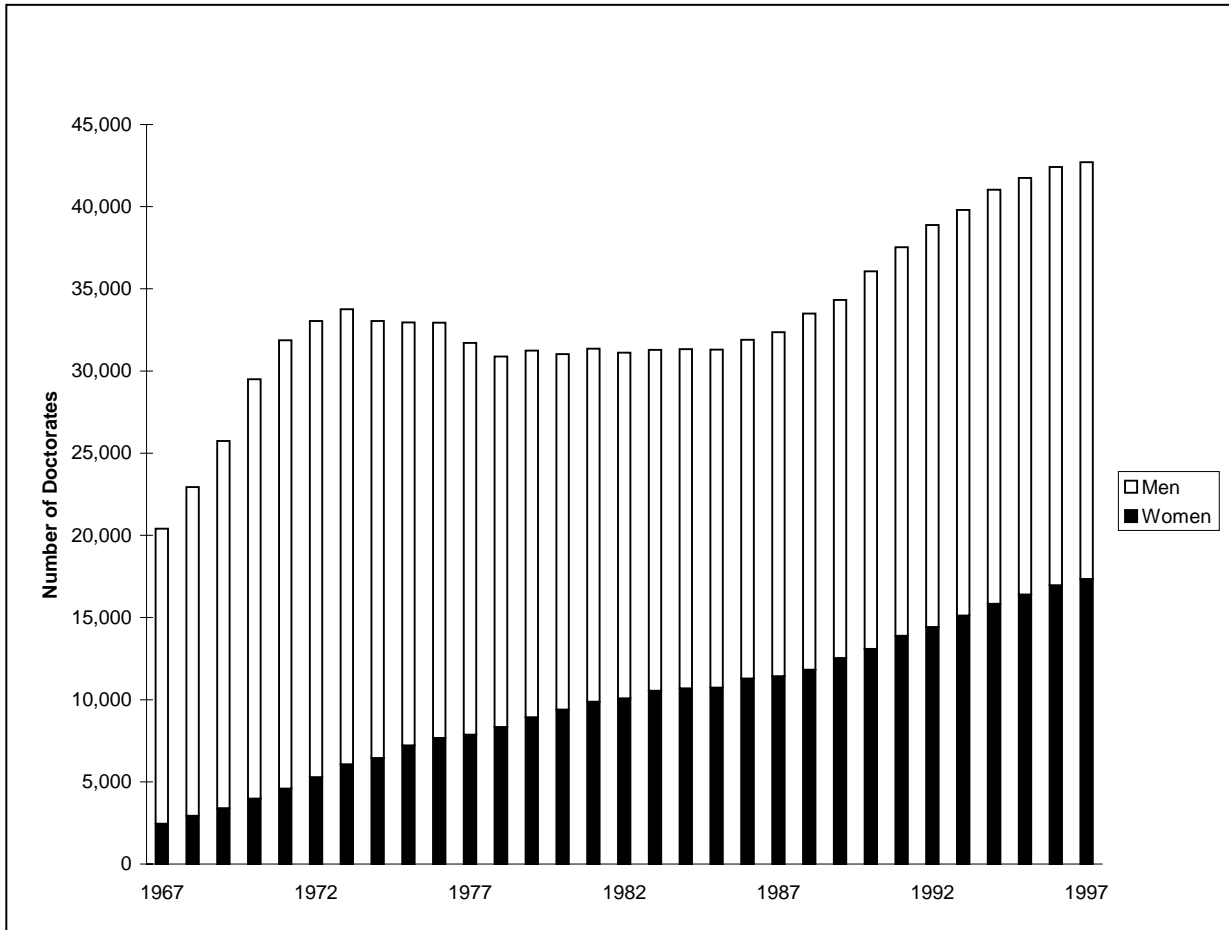
SOURCE: NSF/NIH/NEH/USED/USDA, Survey of Earned Doctorates.

Sex. Women received 17,322 doctorates, or 40.6 percent of all doctorates granted in 1997, both the highest percentage ever and the highest absolute number for women, continuing a 30-year upward trend. (During World War II the proportion of female doctorates increased, and then under the G.I. Bill, the proportion decreased; the percentage fluctuated between 10 and 12 percent for the next decade before it began a steady upward climb in the mid-1960s.) In fact, the increase in the number of female recipients represents one of the most remarkable changes over time: 20 percent higher than in 1992, 52 percent above the total of a decade ago, and a seven-fold increase since 1967. (See Figure 7 and Tables 6 and 7.) The highest one-year total for doctorates awarded to men remains the 1972 number of 27,754; the 1997 total is about 1 percent below the corresponding figure for 1996.

In most major field areas, women continue to exhibit both higher absolute numbers and increasing percentage gains relative to men. Between 1996 and 1997, women registered gains in absolute numbers of doctorates received in five of the seven major fields of study (compared with gains for men in only two fields), and as percentage of doctorates awarded, women increased relative to men in six of the seven categories. Only in the humanities, where females already constitute almost half of all doctoral recipients, did the male percentage increase exceed that for females from 1996 to 1997. (See Figure 8 and Table 6.)

In spite of recent and longer term changes, the sex distribution of doctorates by major academic field remains somewhat bi-modal: In 1997 women ranged between 40 and 63 percent of degree recipients in five fields (and averaged 50.8 percent across these five divisions); in the physical sciences (including mathematics and computer sciences) and engineering, they constituted 22.1 percent and 12.4 percent of doctoral recipients, respectively. (See Figure 8 and Table 6.)

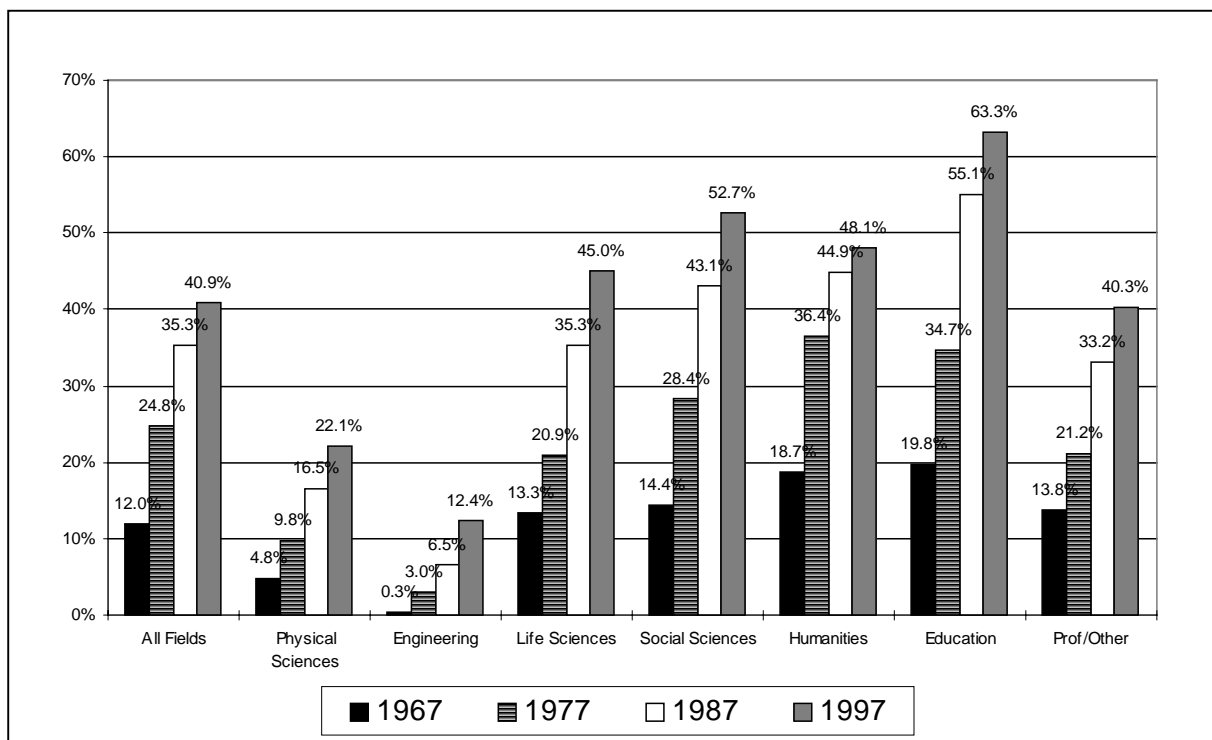
Figure 7
Doctorate recipients by sex, 1967-1997



See Table 7, Page 53.

SOURCE: NSF/NIH/NEH/USED/USDA, Survey of Earned Doctorates.

Figure 8
Percent of female doctorate recipients by field, 1967, 1977, 1987, 1997



See Table 6, Page 52.

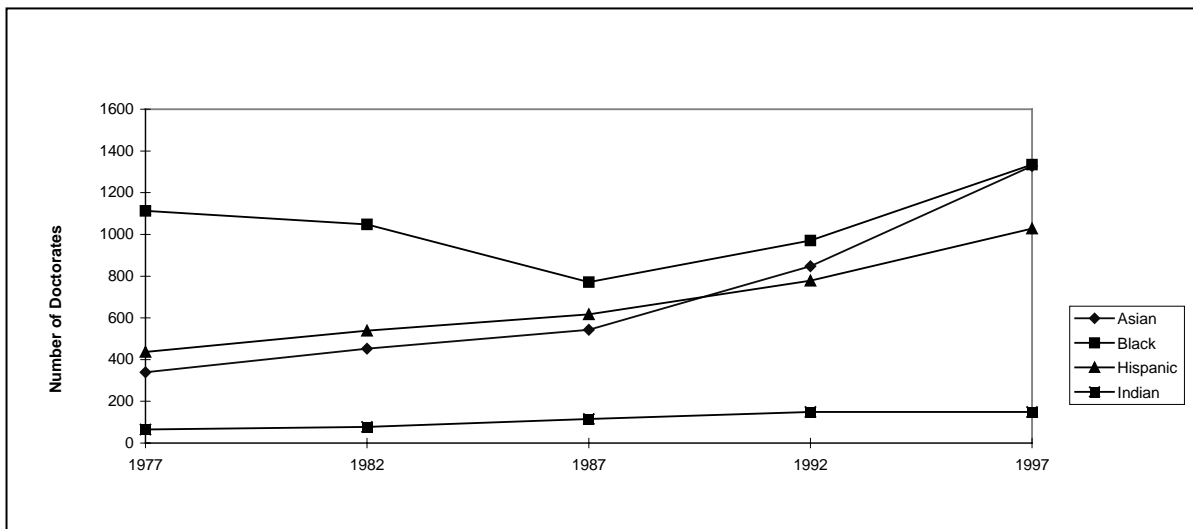
SOURCE: NSF/NIH/NEH/USED/USDA, Survey of Earned Doctorates.

Race/Ethnicity. Between 1996 and 1997 the percentage of doctorates awarded to U.S. racial/ethnic minority groups increased from 8.4 percent to 9.0 percent of all doctorates awarded, and from 12.9 percent to 14.3 percent of doctorates awarded to U.S. citizens. (See Table 8.) Comparisons of U.S. minority Ph.D.s between 1996 and 1997 must note that known racial/ethnic identities in the survey declined from 98.8 percent in 1996 to 97.1 percent for 1997 (in absolute numbers the missing racial/ethnic identifier increased from 343 in 1996 to 807 in 1997). However, the reported number of doctorates received by minorities for 1997 increased in three of the four racial/ethnic categories—for American Indians it was lower—and the direction of the percentage changes would not have been affected significantly by the lower item-response rate for race/ethnicity.

The total number of U.S. minority doctorates for 1997—3,840—is 8.4 percent higher than the number for 1996, 39.8 percent higher than the 1992 figure, and 87.7 percent above the total for 10 years ago. Within racial/ethnic category, when measured on a one-year, five-year or

ten-year basis, Asian Americans show the largest percentage gains. However, black, Hispanic, and American-Indian percentage increases are also sizable—73.2 percent, 66.6 percent and 30.0 percent, respectively, between 1987 and 1997; by contrast, U.S. white doctorate recipients grew in number by 12.5 percent for that same 10-year period. Over a longer period—1977 to 1997—while the number of doctorates awarded to whites remained the same, the number earned by the combined minority grouping doubled. (See Figures 9 and 10 and Table 8.)

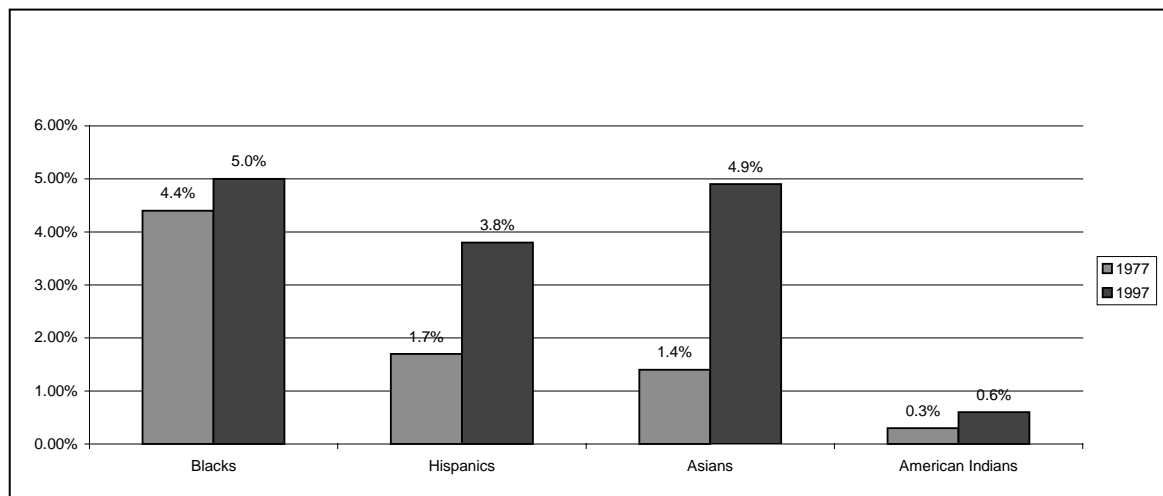
Figure 9
Minority Ph.D.s among U.S. citizens by race/ethnicity, 1977-1997



See Table 8, Page 54.

SOURCE: NSF/NIH/NEH/USED/USDA, Survey of Earned Doctorates.

Figure 10
Percentage of doctorates earned by U.S. minorities, 1977 and 1997

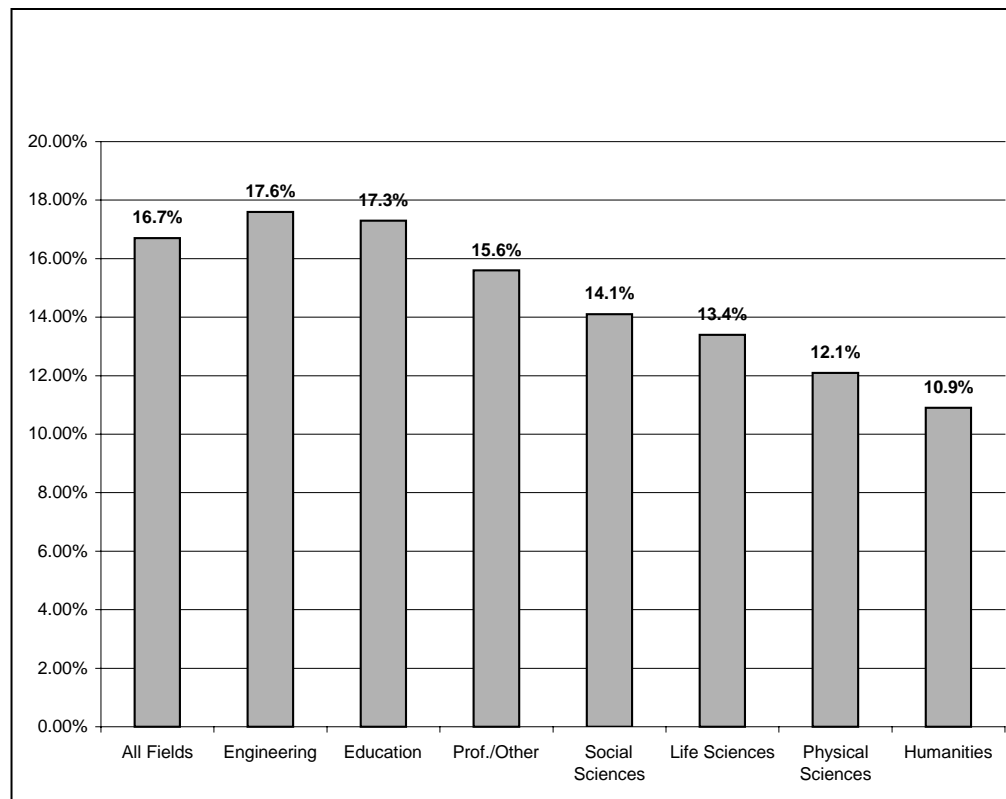


See Table 8, Page 54.

SOURCE: NSF/NIH/NEH/USED/USDA, Survey of Earned Doctorates.

The number of Asian-American doctorates increased across all major fields. For the most part, blacks and Hispanics also exhibited gains, while American-Indian numbers declined. Within the S & E category, both black and Hispanic doctorates grew between 1996 and 1997 (7.9 percent and 2.2 percent, respectively), although in absolute numbers, they remain low. (See Figure 11 and Table 9.)

Figure 11
Percentage of doctorates earned by U.S. minorities
by broad field, 1997



See Table 9, Page 55.

SOURCE: NSF/NIH/NEH/USED/USDA, Survey of Earned Doctorates.

Across major fields, Asian-American students are concentrated in the physical and life sciences and engineering (over 50 percent of Asian Americans are in the latter two categories), whereas the social sciences and education are the two largest fields for the other three ethnic minority groups: 63 percent of blacks are either in education or the social sciences; the corresponding figures for Hispanics and American Indians are 46.2 percent and 52.7 percent, respectively (see Table 9).

Tables 10 and 11 list the leading baccalaureate and doctoral institutions for each of the four U.S. racial/ethnic minority groups over the last few years, by absolute number of degrees (not relative to the size of the respective student bodies).

Citizenship. Although the aggregate number of doctorates awarded increased by 0.7 percent between 1996 and 1997, breakdown by citizenship (see Table 12) shows declines in all three categories—U.S. citizens, permanent residents, and those holding temporary visas—a seeming impossibility explained by the higher than usual “unknown” citizenship category. This is the one area in which this year’s slightly smaller overall response rate matters, not only for the sake of accuracy and completeness, but because the distribution of doctoral awards between U.S. and non-U.S. citizens is of considerable national and institutional interest. Given that international doctoral students are not distributed across fields of study in the same proportion as U.S. students, the uncertainty in citizenship affects to some extent the conclusions that can be drawn from several data series in this report, and, of course, from the special section on international doctorate recipients.

Other non-response items are either consistent with figures from recent years or are thought not to contain any particular bias. (For example, 384 values for sex are missing, but nothing in the data suggests that those values are distributed differently than the known 59 percent male–41 percent female total.) However, there is evidence that underreporting of citizenship status was not random but, in fact, was heavily tilted toward the two non-U.S. citizen groupings, permanent residents and those on temporary visas. With respect to reported citizenship, the U.S. citizen figure dropped by 0.3 percent between 1996 and 1997; the figures for permanent residents and those on temporary visas fell by 22.6 percent and 11.8 percent, respectively, declines too large to be consistent with known enrollment patterns or observed fluctuations in prior years.

The missing citizenship numbers have averaged more than 1,000 per year for many years, but for 1997 the total jumped to 3,647 (versus 1,299 for 1996). Part of the increase stems from the lower overall response rate this year. However, since some of the survey information is provided by the institutions rather than the individual respondents (which has always been the case), visa status may not be known by the graduate schools and thus is not reported. Item non-responses are fairly uniform across the whole questionnaire, so there is no evidence that survey respondents are refusing to provide their citizenship status.

If all of the missing citizenship cases are assumed to be either permanent residents or those on temporary visas, then U.S. citizens received 64.8 percent of all doctorates in 1997.

Under the same assumption, this 1997 number compares with 65.4 percent for 1996 and approximately 66 percent for each of the preceding five years. If the unknown citizenship numbers are distributed across the three citizenship groups in the same proportion as for known citizenship, then the U.S. percentage would rise to 70.8, compared with 67.5 percent for 1996 and about 68 percent for the prior five years. These percentages represent the upper and lower bounds to the biases from the missing citizenship records.

Given that U.S. citizen doctorate recipients as a percentage of those with reported citizenship has remained virtually unchanged for the last several years (at 67.6 percent), an assumption of stability for 1997 as well does not seem unwarranted. That would put the estimated number of U.S. doctorate recipients in 1997 at 28,673 and non-U.S. citizen recipients at 13,742. Extrapolating from recent trends in the distribution between permanent residents and temporary visa holders, these would be approximately 4,122 in the former category and 9,620 in the latter.

All other SED citizenship summary information, including distribution according to field of study, country, and institutions, and a demographic profile, are presented in the special section on international students at the end of the *Survey Report 1997*.

Time to Degree. The amount of time taken by doctoral students to earn their degree can be expressed in various ways. The three ways cited most often, and reported in annual *Summary Reports*, are total elapsed time between receipt of the baccalaureate and granting of the doctorate (Total Time To Degree, TTD); number of years the student is actually registered in a doctoral program (Registered Time to Degree, RTD); and the age at which the doctorate is awarded.

None of these three “clock times” is a precise measure of the time and effort needed to complete a doctorate, nor a gauge of income foregone (or years of earnings remaining). Ideally one would want to capture and exclude years that a student took off for personal reasons or to work, periods in which she or he was enrolled in a program other than the one in which the doctorate was earned, and the amount of time the student may have been gainfully employed professionally (perhaps even full time) while completing final degree requirements. The data currently collected by the SED do not permit such “fine tuning” and the kinds of analyses researchers and policy makers might find most useful.

The RTD measure is often influenced by individual institutional policies governing registration requirements and the availability of financial aid for advanced degree candidates. Other contributing factors are the benefits of and alternatives to being registered for the

individual student, such as eligibility for graduate student housing, health insurance coverage, and availability of loans (and deferrals of loan repayments). This measure also does not distinguish between part-time and full-time enrollment.

Some of the elapsed time may be caused by behavioral factors. The candidate might be weighing of the costs and benefits of being awarded the degree, and thus no longer officially being a graduate student, before actually completing the academic requirements. As noted above, that could mean loss of health or housing benefits, and starting of the “loan clock.” Securing an academic position or successfully acquiring a job, especially when the job market is soft, may be easier while still a graduate student (as opposed to being officially unemployed or working in an interim nonacademic position). In such cases, candidates may be “marking time” by remaining in a position to complete the degree in short order whenever the right job opening materialized.

Nevertheless, the three complementary measures of time to degree, when combined with other survey questions (such as the student’s main activity immediately prior to earning the doctorate), offer useful insights into the path and process of doctoral study.

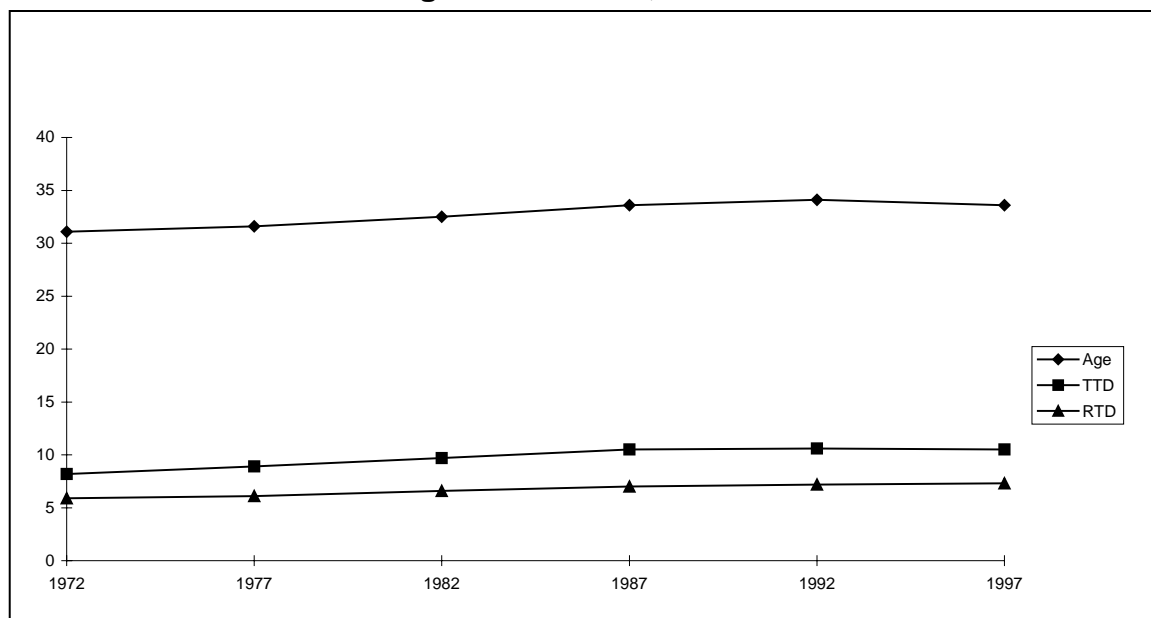
In addition, time to degree is generally reported as an average, with the median as the measure of central tendency employed (because it is less influenced than the mean would be by extremely large values—such by someone who very late in life went back to graduate school or completed a doctorate). Often a measure of dispersion can be as or more important than, or at least provide a good complement to, the measure of an average. In the *Summary Report 1997* we have included one of many ways to display variation in the time to degree—by five-year age groupings—along with the more traditional three measures, first in the aggregate, and then delineated by broad field of study, citizenship, sex, and race/ethnicity.

For 1997 doctoral recipients, the median number of years from the baccalaureate to Ph.D. was 10.5. For males, the median was 10.0 years; for females, 11.5 years. The sex gap is largely due to the disproportionate distribution of recipients by field of study—within broad academic areas, such as S & E fields, total time to degree is similar for men and women (although median times are longer for women in the humanities and professional fields). (See Tables 16 and 17.)

The 1997 median time to degree of 10.5 years is slightly lower than it was for the 1996 doctoral cohort (10.8 years) and about the same as it was 5 years and 10 years ago. The upward trend in total time to degree leveled off in the mid-1980s, and total time has been approximately the same since then (see Figure 12). A variation around that steady average is noticeable, however, by field of study, sex, citizenship status, and race/ethnicity. Apart from education and

the professional/other category, which have decidedly different career trajectories, variation in TTD ranges from 8.7 years in engineering to 11.7 years in the humanities.

Figure 12
Median years to doctorate from baccalaureate award,
and age at doctorate, 1972-1997



See Table 16, Page 61.

SOURCE: NSF/NIH/NEH/USED/USDA, Survey of Earned Doctorates.

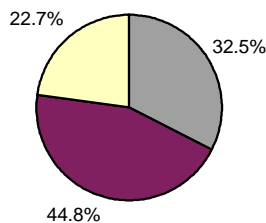
Time to degree measured by actual time registered in the student's doctoral program (RTD) was 7.3 years in 1997, similar to the 1996 figure of 7.2 years. For the last decade, the median registered time has remained approximately constant, at or just above 7 years (see Figure 12). In most instances, the variation by broad field category and demographic characteristic—sex, citizenship, and/or race/ethnicity—hovers within one year of the median.

The typical doctorate recipient in 1997 received his or her degree at 33 years of age (33.6), 0.5 years less than in 1996 but the same as it was 10 years ago. Figure 12 illustrates the slight upward drift, and then a leveling-off, in median age in five-year intervals from 1972 to 1997, a trend that mirrors the TTD and RTD.

As Figure 13 and Table 18 show, there is considerable variation around the median number of years. About a third (32.5 percent) of doctorate recipients are between 21 and 30 at the time the degree is awarded; 44.8 percent are between 31 and 40; and 22.7 percent are over 40 years of age.

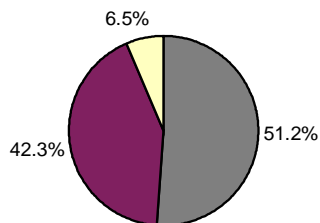
Figure 13
Age distribution at doctorate by field of study, 1997

All Fields



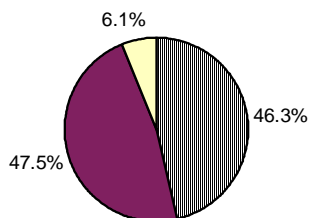
TTD = 10.5 years RTD = 7.3 years

Physical Sciences



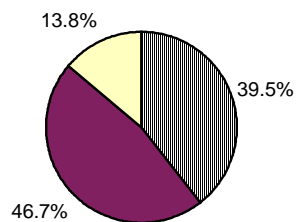
TTD = 8. years RTD = 6.8 years

Engineering



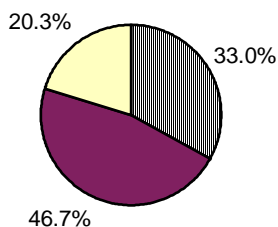
TTD = 8.7 years RTD = 6.5 years

Life Sciences



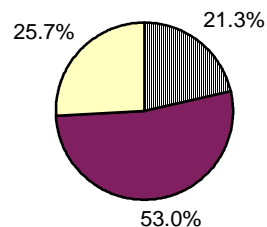
TTD = 9.2 years RTD = 7.0 years

Social Sciences



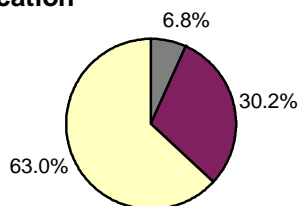
TTD = 10.0 years RTD = 7.5 years

Humanities



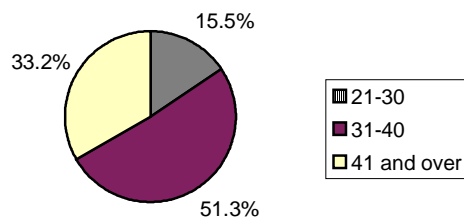
TTD = 11.7 years RTD = 8.6 years

Education

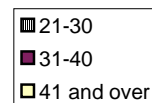


TTD = 20.0 years RTD = 8.4 years

Prof/Other



TTD = 13.5 years RTD = 8.0 years



See Table 18, Page 63.

SOURCE: NSF/NIH/NEH/USED/USDA, Survey of Earned Doctorates.

With regard to broad field of study, over 50 percent (51.1 percent) of doctorate recipients in the physical sciences (including mathematics and computer science), earn their degrees by age 30. In engineering that percentage is 46.3; for the life sciences and social sciences, it is 39.5 and 33.0, respectively. By contrast, only 21.3 percent of humanities recipients have their degree by age 30, with more than half (53.3 percent) of the degrees being awarded to recipients in their 30s. In education, only 6.8 percent earn their doctorate by age 30; almost 45 percent of education doctorates go to those over the age of 45. In the professional/other category, 15.5 percent of doctorates are awarded to those age 30 and younger.

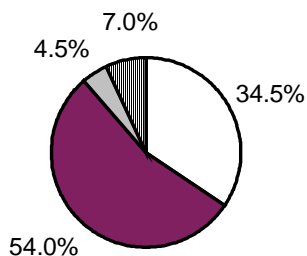
Financial Support. About a third (34.5 percent) of 1997 doctorate recipients reported that their personal or family resources, which includes borrowing, savings, and part-time non-academic earnings, were the primary sources they used to finance their doctoral studies. More than half—53.9 percent—received the majority of their support from such program- or institution-based sources as university fellowships or teaching and research assistantships. Federal, state, foreign government, and employer contributions were the principal sources of financial support for the remaining 11.5 percent of the cases. (See Figure 14 and Table 19.)

Overall, women were more dependent on personal resources than were men (43.2 percent versus 28.6 percent), and U.S. citizens more than those on permanent or temporary visas. However, such statistics are influenced enormously by field of study, where there are such decidedly different patterns and expectations with regard to graduate financial aid, rendering aggregate comparisons virtually meaningless. For example, within the physical sciences (including mathematics and computer sciences), 76.5 percent of doctoral recipients reported university funds as their primary source of financial assistance, and the percentages for men and women were almost identical. In addition, international students are more highly concentrated in academic programs—S & E fields—where traditionally the vast proportion of doctoral students receive financial aid, and teaching and research assistantships are prevalent; that they would report lower percentages in using their own resources is not surprising.

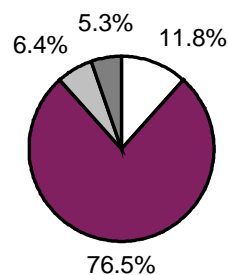
Furthermore, since international students are not eligible for many sources of support—NIH traineeships, NSF fellowships, other agency or private fellowship competitions, participation in U.S. government loan programs—and visa restrictions limit off-campus employment (and spousal employment), non-U.S. citizens (that is, those on permanent or temporary visas) are more reliant on university sources of support than are U.S. citizens within every broad field of study.

Figure 14
Primary sources of financial support for doctorate recipients, 1997

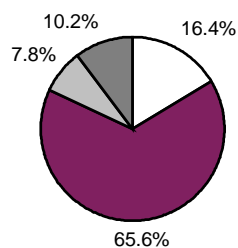
All Fields



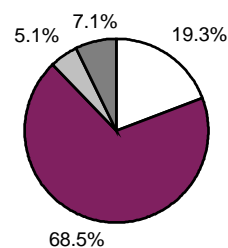
Physical Sciences



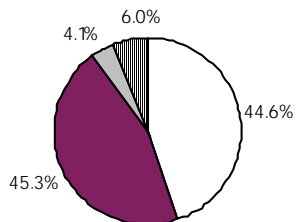
Engineering



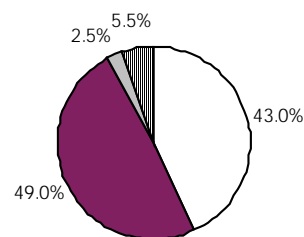
Life Sciences



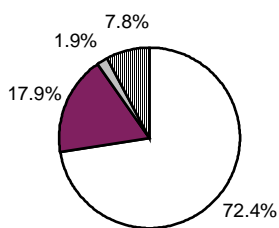
Social Sciences



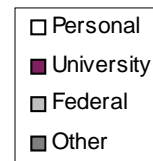
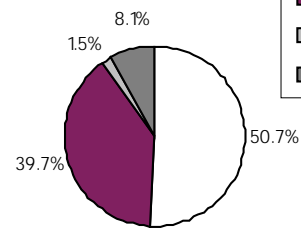
Humanities



Education



Prof/Other



See Table 19, Page 64.

SOURCE: NSF/NIH/NEH/USED/USDA, Survey of Earned Doctorates.

Across the physical sciences, life sciences, and engineering, between two-thirds and three-fourths of 1997 doctorate recipients listed university-based aid as their principal form of support, with the summation of personal sources around 15 percent. In the humanities and social sciences, university and personal sources were both listed for about 45 percent of the students. In education, where part-time enrollment and extended time periods (see above under time to degree) are more common, almost three-fourths of doctoral recipients relied on their own resources to complete their degrees.

With regard to loans as a source of financial aid, 49.1 percent of doctorate recipients reported some level of educational indebtedness at completion of the Ph.D. (See Tables 20 and 21.) The corresponding figure for 1996 was 47.7 percent; it was 47.3 percent in both 1995 and 1994. The survey loan question does not distinguish between undergraduate and graduate education. Also, it is not possible to attribute any specific dollar level or percent participation in official loan programs versus interfamilial support, formal or informal. Furthermore, non-U.S. citizens are not eligible to borrow from Federal or other governmental loan programs, which influences aggregate participation figures.

Finally, the question does not address whether a student had incurred high levels of debt for earlier education, perhaps for his or her undergraduate studies, but had paid them off by the time of entrance into graduate school. For doctoral students in education, whose time to degree is lengthy and part-time enrollment traditional, even prior graduate school loans might have been retired by the time the doctorate was awarded. Thus, reported educational indebtedness can both overstate and understate the extent of borrowing as a source of financial aid. (The *1998 Summary Report* will examine these indebtedness issues in more detail.)

As expected, loan indebtedness varies by citizenship and field of study. It does not vary significantly by sex. Variations in indebtedness by racial/ethnic category, like overall variations in the sources of graduate financial aid (see discussion above, Figure 14, and Table 19), must be viewed in the context of field distributions.⁵

Of those who borrow, 40.5 percent have debt levels of \$10,000 or less; 24.6 percent indicated indebtedness between \$10,000 and \$20,000; 14.3 percent had outstanding loans of \$20,000 to \$30,000; and 20.4 percent owed at least \$30,000.

⁵ Rapoport, Alan I. "What is the Debt Burden of New Science and Engineering Ph.D.s?" Issue Brief, NSF 98-318, National Science Foundation, Division of Science Resources Studies. Arlington, VA. July 8, 1998.

Postgraduation Status and Plans. For the 1997 survey year, 88.3 percent of doctorate recipients provided information on their postgraduation plans. This percentage is lower than for 1996 (90.9 percent) and continues the slight downward trend over time (20 years ago the overall figure was 93.7 percent, but for the S&E fields it was 90.4 percent). More than two-thirds—67.4 percent—of new doctorate recipients reported definite commitments for employment or continued study; in 1996 the corresponding figure was 67.5 percent. (See Tables 22 and 23. Note that in these two tables, “definite” and “seeking” are the only distinctions allowed, so the percentages for a given year are not independent and thus will sum to 100 percent for field, sex, citizenship, or race/ethnicity; the same is true for the absolute numbers in Tables 24 and 25.)

Humanities doctorate recipients revealed the lowest percentage (56.3 percent) of definite postgraduate plans, and education the highest (72.8 percent). The part-time enrollment and the lengthy time-to-degree period in education probably mean that many recipients were already employed in their profession at the time they received their degrees. Men and women indicated similar commitment rates (the small difference observed is attributable to field-of-study distributions); non-U.S. citizens had lower percentages; and among U.S. citizens, Asian Americans had the lowest commitment rate of the four racial/ethnic groupings.

Of those doctorate recipients reporting definite commitments, approximately 72 percent will work and 28 percent will continue their studies. The 72 percent figure is slightly higher than in recent years (which have generally been around 70.5 percent), but the overall percentage is highly sensitive to the distribution of fields of study. In academic fields where formal postdoctoral training is expected, such as in the life sciences, the employment figure drops to 38.7 percent, whereas in the humanities, education, and professional fields, it averages about 95 percent. Field distributions also account for most of the observed variation by sex, citizenship, and race/ethnicity. (See Tables 22 and 23.)

Table 26 contains data on the postdoctoral location—United States or elsewhere—for doctorate recipients by citizenship, visa status, and broad field of study. A discussion of some of these data is contained in the special section on international doctorate recipients that follows.

Employment. For U.S. citizens and those holding permanent visas, 49.1 percent of those with firm employment commitments noted academe as their planned work sector. About one-fourth, 24.7 percent, indicated industry or self-employment; 7.3 percent said some level of government; the remaining 18.9 percent checked “other.” There was considerable variation by field of doctorate, with more than three-fourths of those in the humanities with an academic position but only 15.4 percent of engineering doctorate recipients intending to work in academe.